Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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In the Matter of	)	
	)	
HEAR-IT NOW Petition for Rule Making	)	RM-8658
	)	
Section 68.4(a) of the Commission's Rules: Hearing Aid Compatible Telephones	)	

COMMENTS OF THE CELLULAR TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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SUMMARY

The wireless industry is committed to providing all Americans access to wireless telecommunications services. The HEAR-IT NOW Petition, however, seeks government intervention and the banning of one RF modulation, *i.e.*, GSM as a method to achieve such access. In reality, HEAR-IT NOW is asking the Commission to slow down the introduction of broadband PCS in the United States, and to delay the additional competition and investment in wireless systems and technologies.

PCS devices are within the meaning of "public mobile service" telephones and therefore are currently exempted from the Commission's hearing aid compatibility requirements. The Commission should not initiate a rule making proceeding to limit or revoke the exemption based upon HEAR-IT NOW's Petition. A rule making is inappropriate, particularly when the affected industries are addressing and solving hearing aid compatibility issues. Furthermore, the Petition does not provide a basis for initiating a rule making proceeding. The evidence marshaled by HEAR-IT NOW is insufficient to support a limitation or revocation of the exemption for all PCS devices. Moreover, the studies attached to the Petition and other scientific studies demonstrate that technical solutions exist to afford the hard of hearing access to GSM and other digital

wireless devices. Accordingly, the Commission should deny the HEAR-IT NOW Petition for Rule Making.

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The Cellular Telecommunications Industry Association ("CTIA")[1] hereby submits its comments in response to the Petition for Rule Making to amend Section 68.4(a) of the Commission's Rules filed by Helping Equalize Access Rights in Telecommunications Now ("HEAR-IT NOW").[2]

I. Introduction

The provision of wireless telecommunications capability to all Americans is an important goal of the wireless industry. The Petitioner, HEAR-IT NOW, has asked the

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[1] CTIA is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the association covers all Commercial Mobile Radio Service providers, including cellular, personal communications services, enhanced specialized mobile radio, and mobile satellite services.

[2] *In the Matter of Section 68.4(a) of the Commission's Rules Hearing Aid-Compatible Telephones,* Petition for Rule Making, filed June 5, 1995 ("Petition").

Commission to amend Section 68.4(a) of the Commission's Rules, 47 C.F.R. § 68.4(a), to specify that broadband PCS devices must be hearing aid compatible.[3] The wireless industry, while exempted for HAC requirements, today offers devices which make wireless units compatible with hearing aids. In addition, without any governmental prodding, the wireless industry has undertaken a research program in conjunction with hearing aid manufacturers to facilitate further long range compatibility with digital wireless devices.

The practical effect of the HEAR-IT NOW petition is to ignore these realities and, in the process, slow down the introduction of broadband PCS in the United States, and to delay the additional competition and investment in new wireless systems and technologies that PCS promises to provide.

The studies attached to the Petition, as well as other scientific research, clearly establish that solutions exist today that afford the hearing impaired community with access to digital wireless technologies. In these Comments, CTIA will describe the joint efforts of the wireless and hearing aid industries. Finally, these Comments will also demonstrate how the "evidence" marshaled by HEAR-IT NOW is insufficient to support such the outcome they seek.

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[3] Petition at 1.

II. The HEAR-IT NOW Petition

The HEAR-IT NOW Petition requests a limited revocation of the exemption for wireless telephones contained in the Hearing Aid Compatibility Act of 1988[4] (the "HAC Act").[5] The Petitioner contends that the revocation of the exemption for PCS telephones is warranted based upon the European experience with GSM technology and its interaction with hearing aids.[6]

The Petition incorrectly frames the issue of electromagnetic interaction ("EMI") between PCS telephones and hearing aids as a public health and access issue. EMI is not a public health and access issue, rather it is characterized by scientists as an interference management issue.[7]

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[4] The Hearing Aid Compatibility Act of 1988, Pub. L. No. 100-394, § 3, 102 Stat. 976 (1988).

[5] Petition at 5.

[6] In fact, the European experience with GSM is overwhelmingly positive, not negative. *See infra* Section VI.B. This *Through the Looking Glass* style typifies the Petition. For example, HEAR-IT NOW asserts that "swift action by the Commission ... will ensure universal access to advanced communications for all...." Petition at 1. In fact, market forces and the good faith efforts of the wireless and hearing aid industries have combined to afford hearing impaired persons with access to analog cellular systems in the absence of any Commission action, and similar forces have provided the hearing impaired with access to GSM systems around the world. As CTIA explains in Section IX, *infra.*, progress on providing solutions will stop during the pendency of any rule making.

[7] *See, e.g.*, S. Sharrock, *Interference and Radiation Risks: Are They a Threat to Growth*, Paper presented at the GSM World Congress, Madrid, Spain, 9 (Feb. 7-9, 1995).

The Petition also fails to acknowledge three fundamental principles which are essential to solving interference management issues: 1) Because of its pulsing nature, all digital technologies have the potential to interact with other electronic devices, including hearing aids; 2) while the degree and the nature of the interaction will vary, this interaction is not unusual; and 3) the potential for interaction can be mitigated or eliminated through the cooperative efforts of the industries involved.[8]

The Petition seeks government intervention and banning of new technologies as a way to solve EMI issues.[9] Such action is inappropriate, particularly when the wireless and

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[8] Interference is not limited to wireless telephones. Hearing aid users experience interference from a broad range of electromagnetic sources, including fluorescent lights, automobile electrical systems, computer screens and cables, garage door openers and the anti-theft devices installed by many stores to detect shop-lifting. *See, e.g.*, A. Greville & S. Orr, *Digital Cellphones & Interference with Hearing Aid Users*, National Audiology Centre, Auckland, New Zealand (Aug. 1993), at 10. Even if wireless devices did not exist, the competitive hearing aid manufacturing industry would be developing solutions to EMI. Conversely, banning all wireless devices would not eliminate the overwhelming majority of EMI that affects hearing aid users.

[9] The Petition does not even attempt to square the relief it is seeking with Sections 7 and 309(j) of the Communications Act which requires the FCC to make new services and technologies available with a minimum of delay.

hearing aid industries already have undertaken more appropriate and responsible methods for solving EMI issues.[10]

While the Commission has a statutory obligation to assess periodically the appropriateness of continuing the exemption,[11] CTIA urges the Commission to fulfill its responsibilities by adopting a policy whereby: 1) it will monitor the cooperative efforts of the wireless and hearing aid industries to manage EMI between all wireless telephones and hearing aid devices, and 2) encourage and support the scientific research conducted by the Center for Wireless Electromagnetic Compatibility Hearing Aid Project.

CTIA and the members of HEAR-IT NOW share the common goal of deploying wireless phones that provide the benefits of mobile communications to all segments of the population. The wireless industry's commitment in this regard is evidenced best by the existence of hearing aid compatible cellular phones -- even though cellular phones are exempt from the HAC requirements.

The transition to digital technologies is changing the world around us. It is CTIA's position that realistic solutions exist today to ensure that hearing impaired

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[10] In particular, the Hearing Aid Project of the Center for the Study of Wireless Electromagnetic Compatibility Hearing Aid Project, the use of the HATIS device, and other interim solutions discussed *infra* at Section V.

[11] 47 U.S.C. § 610(b)(2)(C) (1991).

individuals have access to wireless services as we transition to new digital technologies, and that timely, responsible efforts are underway to provide even better solutions as the digital world unfolds. In light of this situation, it is inappropriate for the FCC to take any action at this time.

III. Congress mandated an exemption for mobile service telephones based upon the physical nature of RF interference between hearing aids and mobile service telephones.

The HAC Act provides that the Commission's initial regulations governing hearing aid compatibility shall exempt telephones used with public mobile services and private radio services.[12] In promulgating its rules, the Commission followed the Congressional mandate and adopted the statutory exemption.[13] As the Commission noted at the time, Congress established this exemption because it recognized that the potential for RF interference made operational compatibility impossible between hearing aids and mobile service

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[12] 47 U.S.C. § 610(b)(2)(A).

The Commission has established a "presumption" that all PCS will be licensed as commercial mobile radio service ("CMRS"). A PCS licensee or applicant that proposes to offer PCS as a private mobile radio service must overcome that presumption. *See In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, Second Report and Order,* 9 FCC Rcd 1411, 1461 (1994)("*Second CMRS Report and Order*").

[13] *See* 47 CFR § 68.4(a)(1) and (2)(1994).

telephones.[14] After determining that the physical nature of RF interaction made hearing aid compatibility technically infeasible for mobile service telephones, Congress concluded that a total exemption was warranted "[i]n order to keep these telephones from being pulled from the market," and to not inhibit the technological development and rapid growth of these telecommunications services.[15] Simply stated, after recognizing that there was an irreconcilable conflict between hearing aid compatibility and the very essence of wireless communications, Congress determined that the public interest was best served by exempting wireless devices from hearing aid compatibility requirements. Nevertheless, the wireless industry -- without government prodding -- has taken steps to facilitate the use of wireless telephones by hearing aid users.

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[14] H.R. REP. No. 674, 100th Cong., 2d Sess. 9, 13. ("background ambient noises and magnetic fields associated with mobile communications often interfere with the inductive transmission between the hearing aid and the telephone handset, *thus making compatibility impossible.*" (emphasis added)).

In its adoption of the statutory exemption as part of its Part 68 hearing aid compatibility requirements, the Commission also acknowledged that the potential for RF interference between hearing aids and mobile service telephones made them operationally incompatible. *See In the Matter of Access to Telecommunications Equipment and Services by the Hearing Impaired and Other Disabled Persons, First Report and Order,* 4 FCC Rcd 4596,4600 (1989).

[15] S. REP. No. 391, 100th Cong., 2d Sess. 7 (1988).

IV. Telephones used with PCS are exempted from the hearing aid compatibility requirements.

Prior to 1993, Congress and the Commission classified mobile services into two categories: public mobile services and private land mobile services.[16] In the Omnibus Budget Reconciliation Act of 1993,[17] Congress amended this regulatory classification of mobile services to ensure that similar services are subject to consistent regulatory classification and are accorded similar regulatory treatment.[18] As the Commission correctly notes in the *Second CMRS Report and Order*, Congress sought to achieve regulatory parity and to provide a uniform regulatory framework for mobile services "by replacing the common carrier and private carrier classifications that evolved under the prior statute with the new categories of [commercial mobile radio services] and

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[16] *Cellular Communications Systems, Report and Order*, 86 FCC 2d 469, 471 (1981).

[17] Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), 107 Stat. 312, 392 (1993) ("1993 Budget Act").

[18] H. REP. No. 111, 103rd Cong., 1st Sess. 259 (The 1993 Budget Act "directs the Commission to review its rules and regulations to achieve regulatory parity among services that are substantially similar. In addition, the legislation establishes uniform rules to govern the offering of all commercial mobile services. Uniform rules are needed to ensure that all carriers providing such services are treated as common carriers under the Communications Act of 1934."). *See also* H. R. CONF. REP. No. 213, 103rd Cong., 1st Sess. 494 ("consistent with the public interest, similar services are accorded similar regulatory treatment.").

[private mobile radio services]."[19] Accordingly, the term "public mobile services" under the Communications Act has been reclassified as commercial mobile radio services. Congress has also determined that the definition of "mobile services" specifically includes personal communication services.[20]

The Commission's Rules reflect the statutory reclassification and specifically provide that PCS is within the meaning of "mobile services" and "commercial mobile radio services" ("CMRS")."[21] Because PCS is regulated as a commercial mobile radio service, the congressional mandate for regulatory parity dictates that PCS receives similar regulatory treatment, namely the exemption from the hearing aid compatibility requirements granted to other CMRS providers.

CMRS licensees have selected a variety of digital technologies. Digital cellular technologies mirror the technologies being proposed for PCS. However, all digital technologies are governed by a basic scientific fact: the pulsing of digital RF signals have the potential to interact with other electronic devices.[22] The myopic focus of the

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[19] *Second CMRS Report and Order*, 9 FCC Rcd at 1418.

[20] 47 U.S.C. § 3(n)(1991 & Supp. 1995).

[21] *See* 47 CFR §§ 20.7(f) and 20.9(a)(11).

[22] Qualcomm has results showing that CDMA causes interference. *See Hearing Aid Users Say Wireless Industry*

HEAR-IT NOW Petition on GSM technology ignores this fact and the associated Congressional mandate to exempt all wireless devices from HAC requirements.[23]

Implicit in the statutory mandate creating a uniform regulatory framework for all CMRS licensees is the conclusion that broadband PCS must be regulated in a similar fashion as cellular -- which includes exempting all CMRS devices from the hearing aid compatibility requirements.[24]

Must Solve GSM Interference Problem, COMM. DAILY, July 13, 1995, at 2-3 (quoting Mr. Kevin Kelly, Vice President of External Affairs, Qualcomm).

[23] The digital wireless communications market includes digital cellular radio, digital cordless telephones, paging systems, wireless PBX, personal communication networks, specialized mobile radio and dispatch, digital wireless wide area networks, wireless local area networks, wireless modems, wireless terminals, global positioning systems and satellite-enabled telephones. *See Fast Growth in Digital Wireless Communications*, SEMICONDUCTOR INT'L, June 1995.

[24] While Section 710 of the Communications Act provides for a waiver of the HAC requirements for new telephones or telephones associated with a new technology or service, CTIA, like the Petitioner, proceeds on the assumption that PCS comes within the statutory meaning of mobile services and therefore is exempted by the statute and the Commission rules from the HAC requirements. *See* Petition at 5. Congress included "digital" phones within the scope of the exemption. *See* SEN. REP. No. 391 at 7.

V. A rule making to limit or revoke the exemption is inappropriate, particularly when the affected industries are addressing and solving hearing aid compatibility issues.

Dynamic growth and change, accompanied by the introduction of new technologies and services, are the hallmarks of the CMRS industry. Wireless service providers, including cellular, PCS, ESMR, mobile satellite, and paging, are all offering or developing new digital services. These services will use different types of signaling modulation and technology. Some cellular operators already provide digital service using TDMA modulation -- which is similar to GSM.[25] In the near future, wireless service providers will use CDMA for both cellular and broadband PCS, and GSM 1900 for PCS. Whatever the choice, the pulsed nature of all digital transmissions, including TDMA, CDMA, and GSM modulation, have the potential to interfere with other electronic devices, including hearing aids. While the degree and nature of the interaction will vary, this interaction is not unusual. As the history of microwave ovens, garage door openers and car radios have demonstrated, electromagnetic compatibility between digital and electronic devices can be achieved.

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[25] While similar, U.S. GSM modulation rate is greater than TDMA; in addition, GSM 900 handheld telephones operate at power levels that are double the U.S. standard for cellular TDMA. *See* Exhibit 1.

It is well-settled that interference management issues are best addressed by cooperative inter-industry efforts to achieve electromagnetic compatibility.[26] The wireless and hearing aid industries, along with representatives of the hearing impaired community, have solved many of these problems already, and are working together to develop solutions to the EMI problem between wireless digital telephones and hearing instruments.

A. The Hearing Aid Project of the Center for the Study of Wireless Electromagnetic Compatibility

In 1994, the wireless industry established an independent laboratory, the Center for the Study of Wireless Electromagnetic Compatibility at the University of Oklahoma ("Center"), to assure that every industry and business would have access to electromagnetic evaluation services. The Center serves six major functions:

- Provide testing to assure that electronic devices are properly designed and installed to resist unintended interaction with external electromagnetic sources;
- Host forums to address electromagnetic compatibility issues;
- Perform research to evaluate and resolve electromagnetic compatibility issues;

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[26] *Electromagnetic Compatibility and Medical Devices: Hearings Before the Subcomm. on Information, Justice, Transportation and Agriculture of the House Comm. on Government Operations,* 103d Cong., 2d Sess. (Oct. 5, 1994) (statements of Dr. Thomas P. Stanley, Chief Engineer, Federal Communications Commission and Charles H. Swanson, Vice President, Medtronic, Inc. representing Health Industry Manufacturers Association).

- Educate consumers and users about electromagnetic compatibility considerations;
- Coordinate the activities of industries and organizations involved in setting EMC standards; and
- Assist societies and trade organizations to address inter-industry electromagnetic compatibility issues.[27]

In April 1994, the Center initiated the Hearing Aid Project to develop research on electromagnetic compatibility between hearing aids and wireless telecommunications. Its initial steps included a literature review of studies performed to date and test protocols used.

In June 1995, members of the wireless and hearing aid industries held a planning forum to assist the Center in designing the information collection and test systems necessary to address the electromagnetic interaction between wireless devices and hearing instruments. Approximately 35 representatives from 15 organizations participated in the forum, including wireless manufacturers and carriers, hearing aid manufacturers and research institutes.[28] Goals identified by the participants included:

- Characterize the current state of the art;
- Create a plan for linking the hearing aid and wireless industries for the continuing exchange information;

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[27] For additional information on the Center for the Study of Wireless Electromagnetic Compatibility at the University of Oklahoma, see Exhibit 2 attached.

[28] For a summary of the Planning Forum and a list of its participants, see Exhibit 3 attached.

- Involve the appropriate standards bodies and regulatory agencies;
- Investigate existing standards and identify trends that may affect interaction;
- Provide hearing aid manufacturers and component producers with information on the electromagnetic characteristics of wireless devices;
- Develop a joint industry position quantifying interaction and what can be done to resolve it;
- Conduct testing in phases or tiers so that some information can be available quickly; and
- Involve the appropriate consumer and related industry groups, *e.g.*, audiologists

On July 10, 1995, the Center announced the completion of a draft protocol for testing electromagnetic interaction between wireless telephones and hearing aids. The draft protocol is designed to evaluate objectively and subjectively the electromagnetic interaction so that effective solutions can be identified and implemented.[29] The Center has scheduled preliminary testing for August and September 1995, with prototype testing scheduled in October 1995. Production testing will continue through Fall 1995. Results of tiered testing will be reported as they become available with a final test report available in early 1996.

This cooperative inter-industry effort to achieve electromagnetic compatibility between wireless telephones and hearing aids signifies the effected industries' on-going commitment to develop solutions and to ensure that the

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[29] A copy of the Center's Draft Protocol and a list of the Center's Hearing Aid Design Group are attached as Exhibit 4.

nation's four million hearing aid wearers have access to all wireless digital telephones.

B. Hearing Aid Telephone Interconnect System(HATIS)

HATIS is another solution which the wireless industry and the hearing impaired have embraced to provide access to wireless telecommunications. The HATIS device allows hearing aid wearers, particularly those with a severe hearing loss, to hear callers on their wireless telephones without interference.[30] The device sits behind the ear and works directly with a hearing aid equipped with a "t-coil" switch. It works on inductive coupling and may be used with behind-the-ear and in-the-ear hearing aids, as well as cochlea implants. The electronic signal from the wireless telephone travels straight to the HATIS device, in effect making the hearing aid the receiver and ensuring both volume and clarity.[31]

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[30] The HATIS device was developed by Jo Waldron and her business partner, Shirley A. Crouch. As founders of Phoenix Management, Inc., an organization to counsel people with disabilities, they have been active for several years on issues concerning access for disabled Americans. Appointed by President Ronald Reagan as the 1987 Disabled American for the Nation, Jo Waldron currently serves as a member of the President's Committee on the Employment of People with Disabilities. Having a severe hearing loss, it was her frustration at "being cut off from a world saturated with telecommunications" that lead her to develop the HATIS device. *See* Port, *They're Bearing the Gift of Sound,* BUS. WK., Feb. 6, 1995, at 152.

[31] Howat, *HATIS Hearing Aid Telephone Interconnect System,* CELLULAR BUS., May 1994, at 78.

In their continuing efforts to provide service and access to customers with hearing impairments, several wireless carriers and manufacturers already offer wireless telephones with HATIS-compatible jacks.[32]

C. Other Interim Solutions

There are other interim solutions which provide access to wireless telecommunications for some hearing impaired individuals. For those with mild to moderate hearing loss in one ear, they may switch the wireless digital telephone to the "non-assisted" ear. The use of an analog wireless telephone is another way to provide access to the wireless world, particularly for PCS and mobile satellite telephones that will have dual mode capability. While the above examples are not necessarily the most optimal situations, they are temporary measures that exist today while long-term solutions are being developed.

The Center for Wireless Electromagnetic Compatibility Hearing Aid Project, the HATIS device and the other interim solutions defined above are indicative of the wireless and

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For an illustration of the HATIS device, see Exhibit 5 attached.

[32] AT&T, Ericsson, Fujitsu, Motorola, Nokia and Oki offer wireless phones with HATIS-compatible jacks. AT&T, NYNEX, McCaw, BellSouth, Bell Atlantic and Motorola plan to sell the HATIS device as a telephone accessory. Garrett, *Ready, Willing and Able,* HOME OFFICE COMPUTING, June 1995, at 112.

hearing aid industries' commitment to make wireless telecommunications services accessible to all Americans.

Government intervention is unnecessary when the affected industries have a record of responsiveness to the needs of the hearing impaired, and have demonstrated that they are addressing and resolving the EMI issue in an appropriate and responsible manner.

VI. The Petition provides no basis for a rule making.

While the HAC Act provides the Commission with the authority to limit or revoke the exemption,[33] a rule making proceeding is inappropriate given the gross mischaracterization and lack of evidence presented in the Petition.

In support of its petition, HEAR-IT NOW provides several studies from foreign governments and laboratories, detailing the interference between European standard digital phones and hearing aid devices.[34] The Petition, however, misconstrues

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[33] 47 U.S.C. § 610(b)(2)(C).

To revoke or limit the exemption, the Commission must first make four determinations: 1) such revocation or limitation is in the public interest; 2) continuation of the exemption would have an adverse effect on hearing-impaired individuals; 3) compliance with the HAC requirements is technologically infeasible for the exempted telephones; and 4) compliance with the HAC requirement would not increase costs to such an extent that the exempted telephones could not be marketed successfully. *Id.*

[34] *Interference with hearing aids caused by GSM digital cellular telephones and DECT digital cordless*

the evidence and ignores several major findings from these studies and other related documents.[35]

A. The studies provided with the Petition demonstrate that solutions are available today.

First and foremost, the Petition fails to mention that *the research studies indicate that solutions are readily available to minimize the interference problem,* even at the higher power levels used by European GSM phones.[36] For

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telephones, Conclusive Report by the Working Group on GSM and DECT telephones and hearing aids, National Telecom Agency Denmark (June 28, 1994) ("Denmark Study"); Lauridsen, *EMC and the new Modulation Technologies,* Telecom Denmark Teleaboratoriet (May 1994) ("Lauridsen Study"); A. Greville & S. Orr, *Digital Cellphones & Interference with Hearing Aid Users,* National Audiology Centre, Auckland, New Zealand (Aug. 1993) ("New Zealand Study"); J. Short, *EMC Considerations for Digital Cellular Radio and Hearing Aids,* British Telecom Laboratories, Ipswich, England (June 16, 1992) ("BT Lab Study"); and K. Joyner, M. Wood, E. Burwood, D. Allison, & J. Le Strange, *Interference to Hearing Aids by the new Digital Mobile Telephone System, Global System for Mobile (GSM) Communications Standard,* National Acoustic Laboratories, Sydney, Australia (Mar. 30, 1993) ("1993 Australian Study").

[35] For example, the 1993 Australian Study is described in a subsequent Australian study as an "unpublished preliminary report on interference to hearing aids." J. Le Strange, E. Burwood, D. Byrne, K. Joyner, M. Wood, & G. Symons, *Interference to Hearing Aids by the Digital Mobile Telephone System, Global System for Mobile Communications,(GSM),* NAL Report No. 131, National Acoustic Laboratories, Sydney, Australia, 93 (May 1995) ("1995 Australian Study"). Attached as Exhibit 7.

Significantly , the 1995 Australian Study found that it is possible to design or treat hearing aids to achieve high levels of EMI immunity. *Id., at* 7.

[36] The studies cited by HEAR-IT NOW measure the EMI associated with a maximum power output of 2 Watts, which is

example, National Telecom Agency Denmark and Dr. Ole Lauridsen found that one third of the hearing aids actually in use in their country can be used with a GSM telephone.[37]

As noted above, the HEAR-IT NOW petition references the unpublished preliminary work of the Australian National Acoustic Laboratory (NAL) in March 1993, but ignores NAL's 1995 report which states that "some (high-immunity) models [were tested] for which no interference was detectable even with hearing aid models within a few centimetres from the telephone...."[38]

The studies provided by the Petitioner also indicate that hearing aids have a wide range of immunity levels, *i.e.*, their susceptibility to interference from GSM transmissions

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double the 1 Watt U.S. standard. *See* Exhibit 1. Moreover, some of the studies cited by HEAR-IT NOW measure the EMI associated with an 8 Watt GSM transmitter. In reducing the output power from 2 watts to 1 watt, the field strength is reduced by the square root of the output power.

[37] *See Denmark Study* at 5 ("Out of the total of hearing aids [tested], 16% are immune to the extent that they may be used together with a hand portable GSM telephone used in the same ear as the hearing aid.").

In a letter to Chairman Hundt, Dr. Ole Lauridsen states that "in the existing population of hearing aids, one third had immunity to be used with a GSM telephone." Letter from Dr. Ole Lauridsen to Chairman Reed Hundt (Mar. 26, 1995) (discussing the "misinterpretation and unauthorized comments" attributed to Dr. Lauridsen in a report issued by HEAR-IT NOW's parent, the Wireless Communications Council, concerning EMI between hearing aids and GSM technology) ("March 26th Letter to Chairman Hundt"). Attached as Exhibit 6.

[38] 1995 Australian Study at iii.

(and other sources of EMI) varies greatly. While the studies recommend increasing the immunity level of hearing aids as a viable solution to the EMI issue, the researchers also acknowledge that immunity to prevent interaction is achievable.[39] For example, the 1995 Australian Study concludes that hearing aids can be designed to have a high immunity using several well-known techniques.[40] The European Community is achieving this objective. As of January 1, 1996, all hearing aids sold in the European Community must be immune from normal digital interaction including that from digital (*i.e.*, GSM) phones.[41]

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[39] *See* Denmark Study at 6 ("The smallest types intended to be worn in the ear itself displays the highest degree of immunity; hearing aid users, when using these types of aid, may use a GSM or DECT telephone without experiencing any interference with the functioning of the telephone." *See also* Lauridsen Study at 11("Immunity problems must be solved by fulfilling minimum immunity requirements. This is already anticipated in the EMC directive. Compliance to the existing draft standards for RF immunity will eliminate most of the immunity problems.") *See, e.g.*, BT Lab Study at ¶ 5.

[40] 1995 Australian Study at 47. These techniques include: 1) reducing the lead lengths in the hearing aid; 2) surrounding the amplifier with an electrostatic shield, *e.g.*, a coat of silver-based paint; 3) using shunt capacitors; and 4) impregnating the plastic case part with special stainless steel wire filler. *Id.* at 22.

[41] *See* Denmark Study at 30 ("The EMC Directive (Directive 89/336/EEC) has been in force since 1 January 1992 and its transitional provisions will cease to apply on 31 December 1995. This means that from 1 January 1996, equipment, in order to be placed on the market, must fulfill the essential requirements of the Directive, such as